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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/889,653 | 07/19/2001 | Fuminori Takizawa | P/1909-152 | 8648 |

7590 02/25/2004

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EXAMINER

NGUYEN, LAM S

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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2853

DATE MAILED: 02/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/889,653

Applicant(s)

TAKIZAWA, FUMINORI

Examiner

LAM S NGUYEN

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Objections

Claim 1 is objected to because of the following informalities: “nozzles” in “at least one nozzles” should be rewritten as “nozzle”. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1, 3, 10, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horii et al. (US 6283568) in view of Takahashi (US 6145949).

Horii et al. disclose an ink jet recording head driving method, the ink jet recording head having at least one nozzle (FIG. 5, element 118) and at least one corresponding pressure generating chamber (FIG. 5, element 114) and a piezoelectric actuator (FIG. 5, element 116) corresponding thereto, said process comprising:

scanning said ink jet recording head in a first direction while simultaneously generating a plurality of drive waveform signals (FIG. 2: while the head is scanning, the drive waveform generator 142 generates a plurality of drive waveform signals 145-1 to 145-N);

selecting for said nozzle any one or none of said plurality of drive waveform signals (FIG. 2: the waveform selector 141-1 to 141-n select none or one of waveforms 145-1 to 145-N to output the selected signals 21-1 to 21-n and in Abstract: The selected signal is supplied to a piezoelectric element of a corresponding nozzle); and

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applying said selected drive waveform signals to respective piezoelectric actuator corresponding to said nozzle (FIG. 2: elements corresponding to outputs 21- to 21-n and in Abstract: The selected signal is supplied to a piezoelectric element of a corresponding nozzle) said plurality of drive waveform signals are selected and generated at the time of said scanning in the first direction so that dots with a plurality of gray scale values are generated (Abstract: A new drive waveform is generated and selected at a point during the ejection cycle that is a period during a scan in the first direction for printing. Column 6, line 42-67: different waveforms affect differently to the meniscus position to control the dot size).

Horri et al. do not disclose wherein the drive waveform signals are uniform.

Takahashi discloses an ink jet recorder having nozzles and corresponding pressure generating chambers and piezoelectric actuators (FIG. 2A-B, 3) wherein the actuators are driven by uniform drive waveform signals to secure constant recording density at various temperature (FIG. 5A-C and Abstract).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the drive waveform signals in the printing device disclosed by Horri et al. such that the drive waveform signals are uniform at a certain temperature degree as disclosed by Takahashi. The motivation of doing so is to secure constant recording density at various temperature as taught by Takahashi (Abstract).

Horii et al. also disclose the following claimed limitations:

Referring to claims 3 and 12: characterized in that drive waveform signals for discharging ink droplets with a large jet amount of ink and drive waveform signals for

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discharging ink droplets with a small jet amount of ink are generated simultaneously (FIG. 6A-D: different waveforms for discharging different size of ink droplets).

2. Claims 2, 4-7, 11, 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horii et al. (US 6238568) in view of Takahashi (US 6145949), as applied to claims 1 and 10, and further in view of Shimada et al. (US 6293643).

Horri et al., as modified, disclose the claimed invention as discussed above and also disclose wherein the control means selects said drive waveform signals on the basis of supplied data (FIG. 8) **(Referring to claims 5 and 17)**. However, Horii et al., as modified, do not disclose that the dot forming process is executed at least twice on a same place of said recording medium **(Referring to claims 5 and 14)**, a second nozzle positioned at a different place or the same place from the nozzle used during a previously executed dot forming process pass the place opposite the same place of said recording medium **(Referring to claims 6, 7, 15, 16)**, at least one of said plurality of drive waveform signals is different from a drive waveform signal generated during a previously executed dot forming process **(Referring to claims 2 and 11)**, and drive waveform signals for discharging ink droplets with a large jet amount of ink and drive waveform signals for discharging ink droplets with a small jet amount are alternately generated **(Referring to claims 4 and 13)**.

Shimada et al. disclose the dot forming process is executed at least twice on a same place of said recording medium (FIG. 16: the dot (a big square) is executed three times on the same place of the recording medium), nozzles that are positioned at a different place or the same place from the nozzles used during a previously executed dot forming process pass the place opposite the same place of said recording medium (FIG. 16: nozzles used in the second pass for printing

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sub-dots 2 are positioned at a different place from the nozzles used during the first pass for printing sub-dots 1. Both pass on the same place of the printing medium. FIG. 22: nozzles used in the first and second pass positioned on the same place pass on the same place of the printing medium), at least one of a plurality of drive waveform signals (FIG. 16, the waveform corresponding to the dots 2) is different from a drive waveforms signal (FIG. 16, the waveform corresponding to the dots 1) generated at the previously executed dot forming process, and drive waveform signals for discharging ink droplets with a large jet amount (FIG. 16, ink drops 1) and those with a small jet amount are alternately executed (FIG. 16, ink drops 2).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to include the method of printing a dot by at least twice forming processes with different or same nozzles and different drive waveforms for two consequence processes as disclosed by Shimada et al. into the method of printing as disclosed by Horii et al., as modified. The motivation of doing so is to provide a technique of effectively utilizing at least two different types of dots having different ink densities and different ink weights for preventing of banding so increase the printing quality of a printing apparatus as taught by Shimada et al. (column 2, line 14-17).

3. Claims 8, 9, and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horii et al. (US 6238568) in view of Takahashi (US 6145949) and Shimada et al. (US 6293643), as applied to claims 1, 5, 6, 10, 14, 15, 17, and further in view of Fujimori (US 6338542).

Horri et al., as modified, disclose the claimed invention as discussed above except that the combination of drive waveform signals is determined on the basis of a number of times of said dot forming process is performed and the number of times the same or a different nozzles a

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nozzle passes the place opposite the same place of said recording medium on the basis of a high-speed printing mode for printing a high speed and a high-quality image.

Fujimori discloses the combination of drive waveform signals is determined on the basis of a number of times of said dot forming process is performed and the number of times the same or a different nozzles a nozzle passes the place opposite the same place of said recording medium on the basis of a high-speed printing mode for printing a high speed and a high-quality image (column 17, line 40-49).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to include the combination of drive waveform signals determined on the basis of a number of times of said dot forming process is performed and the number of times the same or a different nozzles a nozzle passes the place opposite the same place of said recording medium as disclosed by Fujimori into the method of printing as disclosed by Horri et al., as modified. The motivation of doing so is to provide a technique that enables flexible setting of a print mode in a printing apparatus to ensure the expression of different densities in respective pixels according to the print mode as taught by Fujimori (column 2, line 15-19).

Response to Arguments

Applicant's arguments with respect to claims 1-4, 10-14, 17-18, 20 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAM S NGUYEN whose telephone number is (703)305-3342. The examiner can normally be reached on 7:00AM - 3:30PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, STEPHEN D MEIER can be reached on (703)308-4896. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

LN

February 6, 2004



HAI PHAM
PRIMARY EXAMINER